

TECHNOLOGY EARLY ACTION MEASURES (TEAM)  
CLIMATE CHANGE ACTION FUND

# environmental solutions economic opportunities

*Second TEAM Progress Report 2001–2003*

## Technology Early Action Measures (TEAM)

### *Affecting change...*

An initiative of the Government of Canada's Climate Change Action Fund, TEAM brings together private and public sector partners to identify, develop and support the most promising environmental technologies in five areas that have the greatest potential to reduce greenhouse gases (GHGs) and lessen our impact on global warming.

As well as developing cleaner fossil fuel technologies and more energy-efficient technology for end-users, we are also supporting the hydrogen economy and the biotechnology sector, where, as just one example, agricultural residue can be turned into fuel. In addition, our goal is to seek out alternative fuel sources and make them commercially viable as part of Canada's overall energy supply.

But that's only half our mission.

### *...and creating jobs.*

While reducing GHG emissions is an environmental challenge, it is also a tremendous economic opportunity.

TEAM funding is driving the application of Canadian research and development in environmental and energy technology that, in turn, grows our economy, creates jobs and offers exciting new export opportunities.

Fewer greenhouse gases, more jobs, a better Canada.

Now *that's* making a difference.

*We invite you to look inside to read more about some of Canada's most innovative technology demonstration initiatives in which TEAM has played an important role.*



Government  
of Canada

Gouvernement  
du Canada

Canada

# TEAM at a glance

## What are greenhouse gases (GHGs)?

There are a number of gases in the atmosphere — carbon dioxide, water vapour and methane, among them — that act much like the glass in a greenhouse by trapping the heat generated by the sun's rays. Simply put, the more GHGs in the atmosphere, the more heat that is trapped. By reducing GHGs, we can help prevent accelerated global warming.

## Why is it important to reduce GHGs?

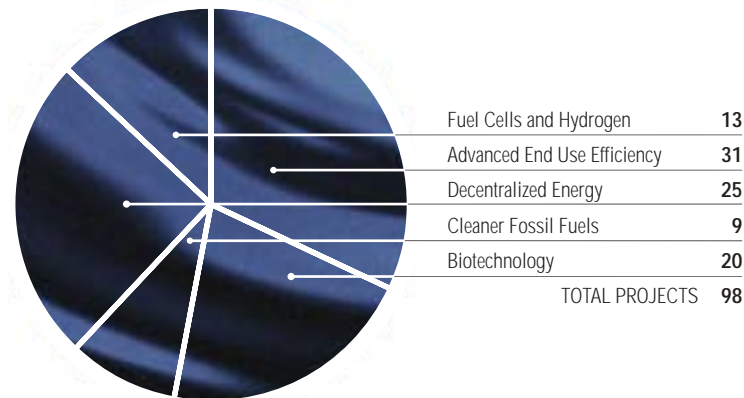
Climate change as a result of excessive GHGs in the atmosphere affects us all, sometimes in ways we don't even fully understand or appreciate. In its broadest sense, climate change affects the environment. A closer look, however, reveals that it affects much more than that.

Climate change affects all aspects of society on all parts of the planet, from the air we breathe and the food and water we consume to the very environmental, economic and political stability we've come to expect.

The Government of Canada is committed to taking effective action that will reduce GHGs while sustaining jobs and economic growth across all sectors of the economy. By harnessing the ideas, passion and financial support of both public and private sector partners, we are able to mobilize the highest level of technical expertise this country has to offer as we work to address this most important issue.

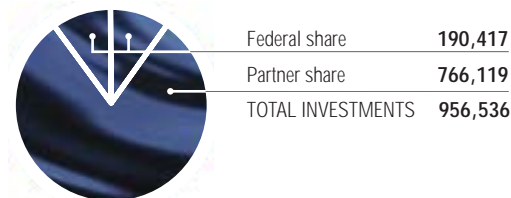
The achievements, so far, are outstanding. And we've only just begun.

### TEAM Sectors (Number of projects)

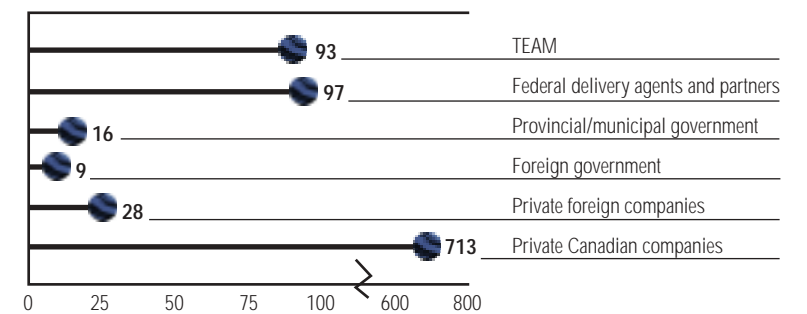


Visit our website at [www.team.gc.ca](http://www.team.gc.ca)

### TEAM Funding (\$ millions)



### TEAM Partners (\$ millions)



### TEAM Projects in Other Countries

- |           |            |          |         |        |
|-----------|------------|----------|---------|--------|
| Argentina | China      | Egypt    | Panama  | Russia |
| Brazil    | Costa Rica | India    | Poland  |        |
| Chile     | Cuba       | Pakistan | Romania |        |

# meeting the climate change challenge

Since it was launched in 1998, TEAM and its partners in both the public and private sectors have served as agents of environmental change in Canada and around the globe. Uniquely positioned to build on existing long-term Government of Canada investments in technology research and development, TEAM establishes partnerships that offer both expertise and funding for innovative ideas designed to reduce GHGs. This produces both workable environmental solutions *and* major economic and export opportunities.

As you read through this report, it will become clear that TEAM- and partner-funded projects continue to make a difference in reducing GHG emissions: by moving the hydrogen economy from research and development to real-world possibility; by moving biotechnology on the farm from untried concepts to real-world demonstration; by transforming energy efficiency from theory to practical implementation; by demonstrating that distributed generation and renewable alternatives are real and viable options for our energy future; and yes, by showing that we can lessen the impact of fossil-fuel use on the environment.

## *SMART Technology*

TEAM is working hard to ensure GHG reduction claims of TEAM-funded projects are evaluated according to the highest standards. Developed in 2002, the SMART protocol (System of Measurement And Reporting for Technologies) has been proven as a rigorous, yet practical and cost-effective approach to evaluation with several TEAM projects in the areas of waste, transportation, bio-fuels, agriculture and forestry. The third edition of the SMART protocol (January 2004) is being applied to all newly funded TEAM projects. It is aligned with the world's leading GHG guidance and standards — including the draft ISO 14064 — that are being developed. Based on real-world data and analyses, the made-in-Canada SMART protocol gauges the technology's performance and benefits and also gives investors — and the Government of Canada — assurance that it works.

# acknowledgements

*As you leaf through the pages of this report, we think that two things in particular will stand out.*

*First, you will see a number of tremendous accomplishments. From projects that turn farm waste into fuel to clean-energy technologies that are helping us significantly reduce GHG emissions, it is truly amazing how much has been done in just six years.*

*Second, and perhaps more importantly, you will be struck by the commitment exhibited by everyone involved.*

*We would like to acknowledge that commitment by extending our appreciation to the many individuals in both the private and public sectors who have been part of the TEAM effort. Without their long-term vision and commitment of time, effort and financial resources, reducing GHGs in Canada would be a good idea and nothing more.*

*Special thanks are extended to the TEAM Executive Committee, Interdepartmental Review Committee, the TEAM Operations Office staff, the Climate Change Secretariat staff and the communications and financial management staff of Natural Resources Canada, Environment Canada and Industry Canada.*

Visit TEAM at: [www.team.gc.ca](http://www.team.gc.ca)

*Additional copies of this report can be obtained from:*

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# environmental solutions, economic opportunities

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## Contents

Making a world of difference . . . . .	4
<i>Environmentally sound, economically viable</i> . . . . .	4
TEAMwork: Planting the seeds and reaping the rewards . . . . .	5
<i>Making it happen...</i> . . . . .	5
<i>...and making it work.</i> . . . . .	5
Climate change priorities	
Cleaner fossil fuels: <i>We all breathe easier</i> . . . . .	6
Canadian Clean Power Coalition: <i>Assessing clean coal-burning technologies</i> . . . . .	6
CETAC-WEST: <i>Bringing eco-efficiencies to the oil and gas sector</i> . . . . .	7
Energy Efficiency Technology: <i>We all have a role to play</i> . . . . .	8
Loblaws Properties Ltd.: <i>New HVAC systems help the environment — and save money</i> . . . . .	8
Fielding Chemical: <i>New technologies for solvent and refrigerant reclamation</i> . . . . .	9
Biotechnology: <i>Waste not, want not</i> . . . . .	10
Iogen: <i>Harvesting our fuel</i> . . . . .	10
Highmark Renewables: <i>Where there is waste, there is opportunity</i> . . . . .	11
Hydrogen: <i>It seems like the perfect fuel</i> . . . . .	12
Ford Motor Company: <i>Real-world results from fuel-cell-powered vehicles</i> . . . . .	12
Hydrogenics: <i>CNE turns to alternate energy source</i> . . . . .	13
Decentralized energy production: <i>Giving Canadians choice, security</i> . . . . .	14
ATS Automation Tooling Systems, Inc.: <i>Next-generation solar energy</i> . . . . .	14
Xantrex Technology: <i>Adding alternative energy sources to the grid</i> . . . . .	15
Appendices	
Appendix One: <i>TEAM Projects</i> . . . . .	17
Appendix Two: <i>Private Companies and Organizations</i> . . . . .	20
Appendix Three: <i>Federal Partner Programs and Departments</i> . . . . .	23
Appendix Four: <i>Other Governments, Government Agencies     and Research Institutions in Canada and Abroad</i> . . . . .	24

# making a world of difference

From coast to coast to coast, Canadians are embracing climate change initiatives.

And it's no wonder.

While the actions we take now will be of great benefit to their grandchildren, Canadians also realize that they are able to reap the rewards *right now*. Energy savings, improved economic competitiveness at home and abroad, job creation, export opportunities, safer workplaces, cleaner air — these are all immediate benefits that we are enjoying as a result of our climate change action. On top of that, by acting now, we can realize environmental and health benefits in the order of \$300 to \$500 million per year.

Under the leadership of Natural Resources Canada, Environment Canada and Industry Canada, TEAM is working with its partners to fund 98 projects in 64 cities in Canada and 12 other countries around the globe so that all Canadians might enjoy these benefits.

Reducing GHG emissions has been and will continue to be a huge challenge for all nations. Only an effort that is equal to that challenge will enable us to make a difference. We can no longer rely on low-cost options. Only with strategic, long-term investments — ones that are both environmentally sound and economically viable

because they are built on sound business principles — will we be able to ensure sustainability and make significant progress in reducing GHG emissions.

## **Environmentally sound, economically viable**

Greenhouse gas reduction is more than just an environmental challenge. It also presents incredible economic opportunities for Canada.

As just one example, making oil and gas refineries more efficient will not only help us breathe easier because fewer contaminants will be released into the atmosphere, but that increased efficiency will result in lower costs and a more competitive sector.

But perhaps even more important than the savings that will be realized, will be the global economic opportunities. Many countries around the world depend on fossil fuels as their main source of energy. By investing in technologies that will help achieve further GHG reductions in the future, we are positioning Canadian companies to supply global markets with GHG-reducing solutions. We are moving into an era with a new approach to energy production and use, one in which these TEAM partnerships are playing a significant role.

When you measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge about it is of a meagre and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science, whatever the matter may be.

LORD KELVIN, BRITISH SCIENTIST, 1824-1907

# teamwork: PLANTING THE SEEDS AND REAPING THE REWARDS

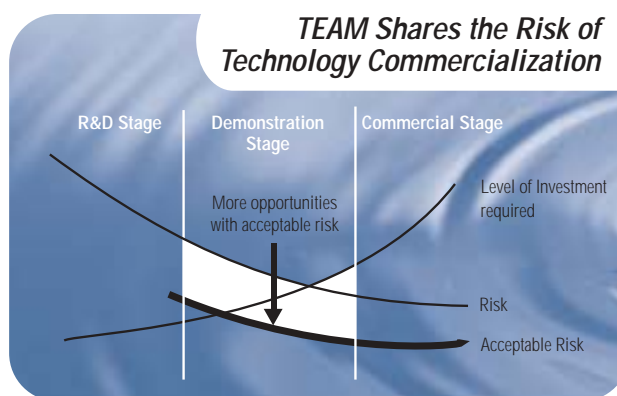
## *Making it happen...*

### CONTRIBUTING DURING A CRITICAL PHASE IN DEVELOPMENT

Taking new, GHG-reducing technologies from research and development to commercialization is critical if Canada is to take advantage of the export and economic opportunities these challenges have to offer. But often, funding for these technologies is difficult to secure during the second stage of development.

When fundamental and applied research and development is carried out early on in the development of new ideas, the technical risk is high, the costs are relatively low and funding sources are usually available. And once the product or technology is demonstrated and proven to work, funding once again becomes readily available because the risks and net costs associated with a proven technology are relatively low. It is during the middle stage of development — at a time when risks may be low but costs are high because of the need to develop, demonstrate and prove new technologies — when funding

is often not available. It is during this critical stage in the development of these job-creating opportunities that TEAM steps in with its private-sector partners to bring both the technical and financial risks to acceptable levels. Without this funding, opportunities would almost surely be lost.



## *...and making it work*

### ACCOUNTABILITY IS A KEY FACTOR IN SELECTING PROJECTS

The source of ideas for innovative technologies can come from anywhere: from municipal, provincial or federal programs; from small- and medium-sized businesses; from large corporations; from international companies or foreign governments. But no matter what the source, before a project is funded, it must demonstrate its eligibility by meeting defined, measurable criteria.

The screening process begins when the idea is proposed to the TEAM Operations Office (TOO). Project proponents work closely with TOO and representatives from federal programs and agencies to determine whether the project is viable and to ensure that it meets the strategic objectives of the Government of Canada's Climate Change Plan.

Following the initial screening, a simplified version of the more formal System of Measurement And Reporting for Technologies (SMART) — referred to as "SMART-Lite" — is applied to provide a clear and consistent basis of the estimated GHG emission-reduction potential of the proposed project. Upon completion of

the SMART-Lite protocol, proposals are sent to an interdepartmental review committee to assess the proposed project in the context of policy and technical objectives of federal departments.

Successful proposals that are approved for TEAM funding must then develop a Project Master Plan (PMP), based on the SMART protocol, before the start of the project to ensure the necessary basis of measurement and reporting activities during project implementation. TEAM funds the work to develop the PMP using pre-qualified third-parties.

Once the project is completed, the final results are reported in accordance with the PMP and, once again, the full SMART protocol is employed to provide a final assessment of the technical and GHG performance of the project.

While TEAM's due diligence is a demanding process, one that is in accordance with best practices and international standards, it provides stakeholders with accurate and transparent documentation of project performance.

# cleaner fossil fuels: we ALL BREATHE easier

With its rich supply of natural resources, Canada has become, quite naturally, heavily dependent on fossil fuels. But while coal-burning plants supply some of our stationary energy grid and petroleum products help meet our transportation needs, we must continue to find ways to both reduce our reliance on fossil fuels and make our consumption of them less harmful to the environment.

There is much to be gained by investing in cleaner fossil fuel technologies. While the obvious benefit is the reduced environmental harm, lower average GHG intensity per unit of activity and the

improved air quality that results, there are many other benefits to Canadians, as well. Increased efficiency in power production, as just one example, will result in cost savings for users. And lower costs enable users to be more competitive, particularly in the global marketplace.

As well, other fossil-fuel-dependent countries are looking to Canada for assistance in dealing with these issues. By investing in cleaner fossil fuel technologies here at home, we will be able to take advantage of those export opportunities.

## CANADIAN CLEAN POWER COALITION

### *Assessing clean coal-burning technologies*



*Photo courtesy of Fluor.*

Imagine a coal-burning plant virtually free from carbon-dioxide emissions and other airborne pollutants. That's the goal of this \$5 million program being championed by the Canadian Clean Power Coalition, an alliance of companies that account for more than 90 percent of Canada's capacity for coal-fired electricity generation.

Coal is an essential part of Canada's clean energy future, accounting for up to 25 percent of our total electrical supply. This project is designed to start producers down the road to clean coal burning, a giant leap forward for Canada's environmental efforts and one that opens up a world of export possibilities. Partners involved in the project include ATCO

Power, EPCOR, Luscar Ltd., Nova Scotia Power Inc., Ontario Power Generation, SaskPower, TransAlta Corporation, the governments of Alberta and Saskatchewan, NRCan's CANMET Energy Technology Centre, the Electric Power Research Institute (US) and the International Energy Agency (UK).

By 2010, the CCPC plans to construct a commercial-scale facility that will be used to demonstrate the technical, environmental and economic viability of new clean coal-burning technology. This plant, capable of reducing emissions by up to 90 percent, will serve as a prototype for future plant construction.





### CETAC-WEST

## ***Bringing eco-efficiencies to the oil-and-gas sector***

*C*reating more value with less ecological impact. It's a simple goal but one that will have huge repercussions across Canada's oil and gas sector.

With funding from TEAM and Western Economic Diversification Canada and support from Alberta Energy, Alberta Environment, Environment Canada, the NRCan Office of Energy Efficiency and Petroleum Technology Alliance Canada, this multi-partner program involves conducting energy- and operational-efficiency audits at some of Alberta's more than 600 natural gas processing plants. It's being championed and coordinated by CETAC-West, a private sector, not-for-profit corporation committed to helping small- and medium-sized enterprises engaged in the development and commercialization of new environmental technologies. CETAC-West forms linkages between technology producers, industry experts, and investment sources to facilitate this process.

The initiative will include the demonstration of at least 10 new technologies in audited plants between mid-2003 and the end of 2005. Ultimately, the program may evolve and reach out to all players and facilities in the upstream petroleum industry, including gas-gathering pipeline networks and small to large gas plants.

## ***Other projects***

A total of nine projects aimed at developing cleaner fossil fuels are completed or currently underway. As well as the two projects highlighted above, three other projects are:

- Enhanced coal bed methane
- Heavy oil recovery using vapour extraction
- Paste technology for oil sands tailings treatment

*“Moving to new sources of energy is an important goal for Canada, and TEAM is enabling that through its main programs, but they also recognize that we have to find ways to be more efficient with the energy sources we use now. TEAM has been a real leader in ensuring that fossil fuels such as coal are being used as efficiently as possible.”*

**JIM DINNING, CHAIR OF THE CANADIAN CLEAN POWER COALITION (CCPC) MANAGEMENT COMMITTEE**

# energy efficiency technology: we all have a role to play

To lower GHGs and have a significant positive impact on the environment, we realize that we must do more than simply increase the efficiency of the energy provider. The energy user plays an equally important role and, as such, TEAM is committed to funding demonstration projects in areas such as the development of integrated, intelligent buildings and the improvement of community-systems management. On the commercial side, TEAM and its partners are also exploring advanced industrial-process technologies and eco-efficient industrial systems. These new systems will not only help us achieve our goal of lowering GHGs, but they will have the added benefit of reducing costs for end users.

We believe that our work in this area — work that involves some of the biggest players in their respective industries — will result in not only lower average GHG intensities per unit of activity, but more than that, it will result in more businesses getting involved in GHG reduction. It will also result in a reduction of technology and services costs, increased industrial energy efficiency and, perhaps as important as anything else, an improved bottom line for business.

## LOBLAW PROPERTIES LTD.

### *New HVAC systems help the environment — and save money*

As Canada's largest food distributor, Loblaw Companies Ltd. is uniquely positioned to be a leader in its industry in environmentally friendly technologies. The company is showing this leadership by working with small- and medium-sized technology suppliers in the development and demonstration of an innovative HVAC (heating, ventilation and air conditioning) and refrigeration system.

This new system offers many benefits: reduced energy use, lower GHG emissions and operational efficiencies, all of which make this system the obvious choice when unit replacement is necessary.

This project aims to reduce the total energy consumption of a typical supermarket by approximately 25 percent and GHG emissions by approximately 50 percent.

Perhaps the most exciting aspect of this project is that this new technology can also be adapted and installed in other locations such as ice-skating and curling rinks where large-scale refrigeration is required.

TEAM Partners include NRCan's CANMET Energy Technology Centre and Office of Energy Efficiency, Hill Phoenix, Hussman Corporation, Keeprite Canada, Micro Thermo Technologies, CES Group, Hydro Quebec and Agence de l'efficacité énergétique du Québec.



## FIELDING CHEMICAL

# *New technologies for solvent and refrigerant reclamation*

Today, many waste solvents are incinerated because current reclamation technology is simply too expensive. This incineration results in wasted resources and increased carbon-dioxide pollution. In this project, Fielding Chemical's objectives are to develop a process to assist in resource recovery and a hybrid plant that can carry out the work.

It is anticipated that the Fielding technology will be substantially more efficient and should result in energy savings of more than 60 percent over currently used methods. The technology will also permit the economical recovery of solvents not currently possible using existing methods and thus save on energy required to produce virgin solvents. As this new technology is implemented as stand-alone units or integrated into existing distillation systems, the energy savings will accumulate, process energy costs will decrease and commercially acceptable solvents will be generated.

The project will take place at Fielding's research and development centre in Mississauga where testing will measure energy consumption, flow-through rates, product quality and system performance. The end result will drive solvent recycling into new domains of resource recovery and economic feasibility.



Partners in this project include NRCan's CANMET Energy Technology Centre, McMaster University, MAS Plastics, Universal GravoPlast, Nye Manufacturing, Liumar, Pyramids Engineering, SNC Lavalin, Arencon, ADD+ Drafting, and Protech.

## *Other projects*

A total of 31 projects aimed at advancing end-use energy efficiency are completed or currently underway. As well as the two projects highlighted above, three other projects are:

- Automated anode replacement system for aluminum production
- Building rehabilitation and energy efficiency in China
- Diesel-electric propulsion for fishing vessels

# BIOTECHNOLOGY: waste NOT, want NOT

**B**iotecnology has a large role to play in providing climate-change solutions. From green chemistry and biomass production (harvesting and transportation) to waste conversion (including cellulosic ethanol and other bio-fuels), plant biotechnology and industrial processes, biotechnology can have a significant impact on reducing GHG emissions.

For example, developing new biotechnologies will enable us to harness residual wastes from forestry and agricultural practices and convert them into energy or value-added products.

By involving agriculture and industry groups and coalitions, community co-operatives, small- to medium-sized enterprises and non-governmental organizations, biotechnology will allow us to develop larger capacity production facilities for alternative fuels, implement effective solutions for contaminated surface and groundwater, and establish cooperative scientific research, development and demonstration programs with agricultural technology programs around the world.

It's good news for farmers and foresters — and it's good news for Canadians.

## IOGEN

### *Harvesting our fuel*

**T**he objective of this Ottawa-based company's alternative fuel program is to turn agricultural plant residue into EcoEthanol™, a product that studies have estimated may have 90 percent fewer CO<sub>2</sub> emissions compared with gasoline, when calculated on a full life-cycle basis. Ethanol can be blended with petroleum-based fuels in amounts of up to 10 percent without appreciable performance changes in today's automobiles.

The production and use of fuel ethanol in Canada currently sits at a volume of 240 million litres per year. The Government of Canada, as reported in its *Climate Change Plan for Canada*, has set a target of 35 percent of gasoline to contain 10 percent ethanol by 2010, requiring 1.4 billion litres of fuel ethanol per year.

Through successful partnerships with the federal government, Iogen has already caught the attention of national and international corporations and these strategic alignments have resulted in investments in excess of \$80 million. Since 1997, Petro-Canada has invested \$20 million with Iogen and, in 2002, the Royal Dutch/Shell Group committed to a \$46 million investment.



## HIGHMARK RENEWABLES

### *Where there is waste, there is opportunity*



The livestock industry is expanding rapidly in Canada and the proper treatment and utilization of large quantities of manure present both challenges and opportunities.

Although Canada is responsible for approximately 2 percent of global GHG emissions, its emission rate per capita is among the highest in the world and pressures to reduce GHG emissions are likely to intensify. The agricultural sector will, without a doubt, be required to contribute to achieve GHG reductions.

This project involves the development of a new technology called the “Integrated Manure Utilization System” (IMUS), that will convert animal manure into renewable energy, solid bio-based fertilizer and reusable water.

This initiative has spawned the construction of a pilot-scale IMUS plant that will produce enough electricity to meet the needs of approximately 750 households. This project alone is estimated to reduce GHG emissions by 13,500 tonnes per year. It is predicted that by 2010, 20 IMUS units, each with a 20,000-head capacity, would reduce GHGs by 740,000 tonnes annually. This estimate is expected to increase dramatically when other livestock, such as poultry and pigs, are included.

The many partners in this project include: Agriculture and Agri-Food Canada, the Federation of Canadian Municipalities, Sustainable Development Technology Canada, the Government of Alberta, the University of Alberta, CETAC-West, the Alberta Research Council, Flint Energy Services, Nolan Cattle Ltd., Rick Paskal Farm, Thompson Livestock Co. Inc., and Cor Van Ray Farms Ltd.

### *Other projects*

A total of 20 biotechnology related projects are completed or currently underway. As well as the two projects highlighted here, three other projects are:

- Landfill methane bioreactor in Egypt
- Montreal biodiesel transit buses
- Wastewater treatment for pulp and paper applications

# HYDROGEN: it seems like the perfect fuel

**H**ydrogen: it's readily available; its by-product is water; and it will never be in short supply — on the surface, it seems like the perfect fuel. However, there are still obstacles to overcome before we are powering our homes, commercial enterprises or automobiles exclusively with hydrogen.

TEAM and its partners — including industry groups and coalitions, international organizations, small- to medium-sized enterprises and policy developers — are supporting hydrogen-related research and development in a number of areas that address our ability to use

hydrogen in both stationary (providing energy to homes and business) and transportation applications. TEAM's commitments in support of a range of hydrogen projects have helped pave the way for future investments in infrastructure such as "H2 villages" and "H2 highways."

Since 1998, \$16 million from TEAM has been allocated to 13 hydrogen-economy-related projects, the total value of which is \$113 million.

## FORD MOTOR COMPANY

### *Real-world demonstration of fuel cell powered vehicles*



**T**he Vancouver Fuel Cell Vehicle Program (VFCVP) is considered a critical next step in the evolution of fuel cell technology for automobiles on their way to widespread commercialization.

For the first time, valuable information that is needed to improve the performance, reliability and durability of fuel cell vehicles, will be collected and analyzed under real-world conditions. As well as allowing for the careful analysis of user interaction and comfort with this new technology, needs with respect to the requisite hydrogen refueling infrastructure will be assessed.

On top of this, the project will provide valuable insight to all levels of government on

actual GHG and regulated emissions reduction capabilities, on current standards and code gaps, and on regulatory issues and costs that could preclude the early market entry of commercial fuel cell vehicles into Canada.

Sponsored by TEAM partners that include the Ford Motor Company, the Government of British Columbia, Fuel Cells Canada, and NRC's CANMET Energy Technology Centre, this project is vital in the evolution of fuel cell technology for automobiles, the development of a hydrogen economy and a sustainable zero-emission-based transportation system in Canada with reduced GHG emissions.

## *CNE turns to alternate energy source*



“Hydrogen fuel is real and it is here now,” said Pierre Rivard, President and CEO of Hydrogenics Corporation, as he unveiled a live, working demonstration of a 50 kW hydrogen HySTAT™ fuel cell stationary power generator, one of the world’s most promising clean energy technologies, at the Canadian National Exhibition (CNE) in August 2003.

And it just gets better.

During the second phase of the project, officials of the National Trade Centre (located at Exhibition Place) hope to tap into the power generator as a backup power source when necessary. They also hope to use it to reduce the Centre’s dependency on traditional energy sources during peak periods such as on hot, humid days when air-conditioning use is at its highest. The unit, developed by Hydrogenics Corporation, a leading clean power generation company, currently produces enough energy to meet the energy requirements of approximately 15 average Canadian homes. This phase of the project will also show the energy source’s durability in stationary applications.

Partners in this project include the City of Toronto, the Canadian National Exhibition, Exhibition Place, John Deere & Co., Dynetek Industries Ltd., QuestAir Technologies, and NRC’s CANMET Energy Technology Centre.

## *Other projects*

A total of 13 projects aimed at developing the hydrogen economy are completed or currently underway. As well as the two projects highlighted above, three other projects are:

- Solid oxide fuel cell heat and power demonstration
- Fuel cell enabling electronics
- Compressor for hydrogen fuelling stations

“Canada is a leader in the hydrogen energy field, but it probably wouldn’t be without the support of initiatives like TEAM. In a country with as small a population as Canada, there just aren’t many private sources of support for technologies that are in their infancy, so TEAM has become a crucial player in helping move Canadian ideas from the drawing board to become products that can be commercialized.”

Pierre Rivard, President and CEO, Hydrogenics Corporation

# Decentralized energy production: GIVING CANADIANS CHOICES, SECURITY

Because our society is so heavily dependant on centralized energy production derived from fossil fuels for its energy, it makes sense to seek alternatives. Energy from a variety of sources both ensures a plentiful supply and prevents us from being overly reliant on a single source.

TEAM's first objective, however, is to seek and fund technology demonstrations that help reduce GHG emissions. As such, within the context of decentralizing energy production, TEAM is identifying opportunities that involve everything from technologies for small- to intermediate-scale fossil fuel conversion such as micro-turbines, to

renewable energy sources such as wind turbines, wave energy, solar energy and the conversion of biomass- and agricultural-residue into energy.

TEAM also supports activities involving the storage and uses of these technologies.

This work will serve to lower energy costs and give Canadians a more reliable energy supply system. As well as these critical benefits, this will also give us the knowledge necessary to develop sound public policy on these very important issues.

## ATS AUTOMATION TOOLING SYSTEMS / SPHERAL SOLAR POWER

### *Next-generation solar energy*



With today's growing population, environmental problems and the world's thirst for energy, industry experts are predicting that photovoltaics — which turn sunlight into usable electricity — will be the next breakaway industry. But for solar energy to supply just one percent of world electricity demand, hundreds of gigawatts of affordable solar systems would need to be installed over the next two decades.

Today, the photovoltaics industry is dominated by fragile silicon wafers, a technology that eventually could be limited by high-purity silicon supply and the cost of raw materials.

To address these issues, TEAM and Technology Partnerships Canada are funding a new type of solar technology that is made from silicon and aluminum, two materials that are in abundant supply. Other benefits include its flexibility — the foil sheets that comprise thousands of tiny silicon spheres bonded in a flexible aluminum foil matrix can conform to almost any shape — its lower silicon requirements and, because there are no heavy metals or toxic compounds present in the product, its environmental friendliness.



## *Adding alternative energy sources to the grid*

Canada is the world's sixth largest producer of electricity, and the largest producer of hydroelectric power. Canada also has one of the most diversified bases of electricity generation in the world with power being supplied by hydroelectricity, natural gas, oil, coal, nuclear power and, increasingly, renewable energy. But just because a source is available, doesn't automatically mean that it can be connected to the power grid, that huge interconnected system of power plants, substations and transmission lines that brings us electricity. Often, the power that is generated must be converted from direct current to alternating current and it must be "conditioned" so that we do not experience spikes and current failures that would result in, for example, the dimming and brightening of lights.

TEAM and its partner, NRC's CANMET Energy Technology Centre, are supporting the development and demonstration of a multi-energy platform that would enable different types of generated power to be integrated at a site or to be fed into the grid. While



these alternative sources of energy would help us reduce GHGs, this technology would also make Canada a leader in advanced power electronics and multi-energy controls, opening up a host of exporting possibilities.

## *Other projects*

A total of 25 projects aimed at decentralizing the energy sector are completed or currently underway. As well as the two projects highlighted above, three other projects are:

- Wind-diesel control systems in Newfoundland and Labrador
- Building Integrated Photovoltaics (BIPV) in high performance curtain walls
- District solar heating

*"Working with TEAM is more like a partnership than a normal financial arrangement. They aren't just a bureaucracy that makes decisions and asks for results, they have enough experience that they are able to act as a sounding board for new ideas and initiatives, which is a big help for a young company."*

*Milfred Hammerbacher, President of Spherical Solar Power, Inc.*



# appendices

## Appendix One: TEAM Projects

Project Number	Title/Description	Project Investments (\$K)		
		Total	TEAM	Other Federal
<b>GRAND TOTALS: 98 PROJECTS</b>		<b>\$956,536</b>	<b>\$93,421</b>	<b>\$96,996</b>
<b>ADVANCED END-USE EFFICIENCY: 31 PROJECTS</b>		<b>\$354,686</b>	<b>\$25,563</b>	<b>\$27,579</b>
COM-02	Montreal electric vehicles	\$2,400	\$420	\$100
INT-08	Natural gas technology in Romania	\$993	\$515	\$120
INT-10	Low emission autorickshaws in Pakistan	\$1,244	\$347	\$235
IND-68	eKOCOMFORT advanced home HVAC appliance	\$13,985	\$2,900	\$715
INT-20	Landfill demonstration in Brazil	\$1,947	\$585	\$132
IND-03	Microwave-assisted edible oil production	\$7,987	\$1,987	\$400
INT-30	Natural gas motorcycles in Egypt	\$1,410	\$580	\$110
TPC 731 473889	Small engine technology	\$27,294	\$1,000	\$8,280
TPC 731-461093	Hybrid electric bus	\$28,190	\$1,000	\$7,457
COM-58	Fly ash in concrete construction	\$27,589	\$257	\$106
IND-92	Sustainable buildings using life-cycle assesment	\$765	\$225	\$90
IND-096	Rapid cooling of foods in commercial kitchens	\$4,989	\$803	\$250
IND-100	New membranes for water and wastewater treatment	\$4,075	\$1,575	\$500
COM-54	Green roof technology	\$840	\$320	\$105
IND-63	SME eco-efficiency	\$3,996	\$578	\$624
IND-73	Plasma treatment for tool and dye manufacturers	\$2,686	\$859	\$286
IND-091	High-volume fly ash for roadways	\$743	\$315	\$48
IND-70	Natural gas technologies for industrial settings	\$11,598	\$787	\$262
INT-29	Energy efficiency program in Russia	\$3,316	\$384	\$2,072
COM-59	Gas infusion for wastewater treatment facilities	\$1,554	\$620	\$269
INT-39	Hydrocarbon refrigerant in Cuba	\$337	\$152	\$40
IND-97	Automated anode replacement system for aluminum production	\$6,528	\$1,155	\$485
IND-110	Air-cooled refrigerant compressor	\$9,598	\$1,506	\$478
IND-107	Home natural gas refueling appliance	\$9,030	\$1,036	\$1,983
IND-101	High Pressure Direct Injection (HPDI) engines	\$2,265	\$805	\$250
COM-79	EcoSmart Concrete	\$154,551	\$1,090	\$720
IND-111	Pervaporation technology	\$1,058	\$350	\$102
IND-115	Advanced harvesting technology	\$923	\$198	\$65
IND-123	HVAC and refrigeration systems for supermarkets	\$3,344	\$734	\$155
INT-40	Building rehabilitation and energy efficiency in China	\$7,297	\$980	\$365
IND-130	Diesel electric propulsion for fishing vessels	\$12,154	\$1,500	\$775
<b>BIOTECHNOLOGY: 20 PROJECTS</b>		<b>\$127,732</b>	<b>\$19,995</b>	<b>\$15,138</b>
TPC 731-122410	Production of ethanol from agricultural waste and crops	\$45,000	\$4,980	\$4,987
TPC 731-451040	Municipal solid waste digestion for power production	\$27,220	\$2,725	\$4,080
IND-48	Development of high-grade pelletized activated carbon	\$1,157	\$434	\$145
IND-62	Green diesel from pyrolysis oil	\$410	\$156	\$50

Project Number	Title/Description	Project Investments (\$K)		
		Total	TEAM	Other Federal
INT-31	Landfill methane bioreactor in Egypt	\$1,740	\$760	\$140
COM-08	Cryogenic processing of landfill gas to high-value products	\$1,091	\$563	\$210
INT-41	Demonstration project for peak electrical power generation	\$1,988	\$797	\$180
COM-56	On-farm demonstration of manure treatment technologies	\$459	\$84	\$400
IND-58	Szego mill process	\$854	\$324	\$108
INT-17	Energy from waste in Argentina	\$2,280	\$987	\$240
INT-24	Seedling inoculation in Chile	\$2,767	\$872	\$155
COM-47	Composting of swine manure	\$460	\$200	\$55
COM-48	Co-composting of industrial/municipal wastes	\$1,786	\$336	\$190
COM-81	Montreal biodiesel transit buses	\$3,701	\$436	\$100
IND-105	Biodiesel technology processing	\$1,228	\$465	\$138
IND-109	Enzymes for fuel ethanol production	\$5,475	\$1,875	\$900
IND-103	Biomass gasification system for greenhouse applications	\$765	\$335	\$60
COM-90	Aerobic manure treatment for pork producers	\$1,700	\$500	\$300
IND-102	Wastewater treatment for pulp and paper applications	\$19,798	\$2,348	\$750
COM-89	Integrated Manure Utilization System (IMUS)	\$7,853	\$818	\$1,950
<b>CLEANER FOSSIL FUELS: 9 PROJECTS</b>		<b>\$52,306</b>	<b>\$8,110</b>	<b>\$3,260</b>
IND-76	Coal-bed methane	\$15,300	\$2,250	\$750
IND-94	VAPEX engineering for heavy oil recovery	\$315	\$65	\$38
IND-67	Oil sands thermal solvent process	\$697	\$189	\$8
IND-95	Thermal solvent process extension	\$357	\$92	\$-
IND-090	Fine tailings paste technology	\$2,272	\$607	\$15
IND-112	Application of advanced clean coal technology	\$4,998	\$1,000	\$666
IND-113	Flue gas desulphurization with fertilizer co-product	\$22,000	\$2,574	\$823
IND-117	GHG gas imaging systems	\$1,261	\$297	\$85
IND-119	Energy audits in the upstream oil and gas sector	\$5,106	\$1,036	\$875
<b>DECENTRALIZED ENERGY: 25 PROJECTS</b>		<b>\$308,186</b>	<b>\$20,891</b>	<b>\$32,632</b>
INT-02	Small hydro control systems in China	\$3,349	\$557	\$260
COM-35	Wind power cooperative in Toronto	\$1,549	\$347	\$121
TPC 731-461092	Gas turbines for bio-oil	\$4,024	\$667	\$1,265
COM-01	Sudbury cogeneration district energy	\$14,500	\$545	\$200
IND-78	Micro-turbines for heat & electricity	\$668	\$113	\$38
INT-28	Solar photovoltaics for developing & developed countries	\$10,426	\$3,267	\$847
COM-46	Building Integrated Photovoltaics (BIPV)	\$300	\$110	\$40
COM-51	Watson Lake district energy	\$750	\$109	\$28
IND-61	Solar water heating	\$5,346	\$760	\$231
INT-32	Multi-country solar drying	\$1,583	\$583	\$175
IND-116	Manufacturing process for generic wind turbine blades	\$1,791	\$970	\$-
INT-38	Small hydro development in Nepal	\$8,305	\$680	\$100

Project Number	Title/Description	Project Investments (\$K)		
		Total	TEAM	Other Federal
COM-60	Mini and small hydro demo in National Capital Region	\$15,905	\$412	\$135
IND-089	Canadian 10 and 60 kW wind turbines	\$2,246	\$999	\$162
COM-43	Heat recovery from diesel power generation	\$1,440	\$400	\$-
COM-10	Deep lake cooling	\$110,150	\$1,150	\$-
INT-25	Low-head hydro in Poland	\$12,151	\$746	\$245
IND-74	Morgan Falls small hydro demonstration	\$943	\$400	\$72
COM-38	Adopt-a-roof solar thermal technology	\$230	\$82	\$42
IND-118	Spherical Solar Technology	\$98,482	\$4,150	\$25,500
COM-86	Photovoltaic solar homes	\$2,073	\$891	\$160
COM-92	Wind-diesel control systems in Newfoundland	\$1,225	\$528	\$111
IND-124	Multi-energy source platforms for distributed generation	\$3,206	\$818	\$190
IND-125	BIPV in high-performance curtain walls	\$2,800	\$599	\$150
COM-91	District solar heating	\$4,744	\$1,009	\$2,560
<b>FUEL CELLS AND HYDROGEN: 13 PROJECTS</b>		<b>\$113,627</b>	<b>\$16,967</b>	<b>\$18,388</b>
TPC 731-460753	Hydrogen supply for fleet use	\$17,700	\$1,500	\$5,541
IND-56	Hydrogen refueling appliance	\$4,025	\$2,123	\$375
TPC 731-122373	Oxygen separation technology	\$14,135	\$1,500	\$3,447
IND-79	Solid oxide fuel cell materials	\$550	\$163	\$94
IND-084	Intelligent control systems for fuel cell vehicles	\$2,945	\$765	\$350
IND-75	Solid oxide fuel cell heat & power demonstration	\$26,250	\$1,119	\$373
IND-80	Solid oxide fuel cell heat & power balance of plant	\$1,600	\$378	\$200
IND-088	Fuel cell powered 10 and 50kW generators	\$6,078	\$1,678	\$400
TPC 730 477199	Gaseous fuel control program	\$19,500	\$1,142	\$5,358
IND-086	Compressed H2 on-board storage	\$1,044	\$534	\$150
IND-99	Fuel cell enabling electronics	\$9,275	\$2,605	\$1,500
IND-122	Compressed hydrogen fuelling stations	\$4,030	\$1,730	\$300
IND-128	Vancouver fuel cell vehicle demonstration	\$6,495	\$1,730	\$300
<b>TEAM ADMIN</b>		<b>\$3,721</b>	<b>\$1,895</b>	<b>\$1,618</b>

## Appendix Two: Private Companies and Organizations

A.E Concrete Precast Products Ltd.	Blossom Agritech Ltd	Conestoga-Rovers & Associates (CRA)
AFS	Brentwood Sky Train Station	Confederaco-Nacional da Industria (CNI), Brazil
Agile Systems Inc.	British Petroleum Corporation	Con-Force Structures Ltd.
Air Liquide Canada Inc. (ALC)	Busby and Associates Architects	Conserval Engineering Inc.
Airborne Technologies Inc.	Café Duran	Consolidated Energy Solution
Alberta Energy Company	Cairo Solid Waste Management Authority (CSWMA)	Consortium for Research on Renewable Industrial Materials (CORRIM II)
Alberta Energy Research Institute	Canadian Centre for Remote Sensing	Cook Homes Ltd.
Algonquin Power Systems	Canadian Clean Power Coalition	Cooke and Dennison
Aluminerie Luralco	Canadian Electrical Association	Coordinación Ecológica Area Metropolitana Sociedad del Estado (CEAMSE)
AMEC Earth and Environmental Ltd.	Canadian Environment Industry Association (CEIA)	Corporacion Peters
Amoco Canada Petroleum Company Ltd.	Canadian Hydro Control Systems Inc. (CHCS)	CORDA
AMP Fisheries Ltd.	Canadian Manufactured Housing Association	CryoFuel System Inc.
Architectura	Canadian Portland Cement Association	Cummings Cockburn
Architecture Alliance	Canadian Renewable Fuels Association	Cummins, Inc.
Arise Technologies Corporation	CanAmerica Foods (now Bunge Ltd.)	Dacia (Romania)
Artian Construction	Cement Association of Canada	David Suzuki Foundation
Arviat Development Corporation (ADC)	CEMEX (Mexico)	De Boer
AS Moore Consulting	Central Canadian Structures	Dendron Resource Surveys Inc.
ATCO Power Canada Ltd.	Centre d'expérimentation des véhicules électriques du Québec (CEVEQ)	Dessau Soprin
ATHENA Sustainable Materials Institute	CETAC-West	Distell Company Ltd.
ATS Automation Tooling System, Inc.	CFS Alternative Fuels Inc.	DSE Associates
AWMC Management Corporation	Charonic Canada Inc. (CCi)	Duke Energy
B.C. Gas International (Canada)	Chessen Group Inc.	DynaMotive Energy Systems Corporation
Babcox and Wilcox	Chesterman Property Group	Dynetek Industries Ltd.
Baker McGarva Hart Architects	Chevron Canada Resources Ltd.	Eastern Power Development Corporation
Balochistan EPA	Chreod Ltd.	ECO Fuels
BC Building Corporation	CIBC	Egyptian Light Transportation Manufacturing Company (EI TRAMCO)
BC Gas	Clearstone Engineering Ltd.	Egyptian Motorcycles and Bicycles Company (EBC)
BC Hydro	Cominco	Enbridge Consumers Gas
BC Ready Mixed Concrete Association	Commercial Alcohols Inc. (CAI)	ENERCON (Pakistan)
BC Research	Commonwealth Historic Resource Management Ltd.	Energy Ottawa
BC Trade & Investment	Computalog	Enerkem Technologies Inc.
BC Vegetable Growers	CONDER	Enermodal Engineering
BCIT		EnerWorks
Business Development Bank of Canada		
BDCL Design Group Ltd.		
BIOX Corporation		

ENSI Canada  
 Ensyn Technologies  
 EnTech Environmental Technology Inc.  
 Envirogain  
 EPCOR Utilities Inc.  
 EPRI  
 ESI Ecosystem International Ltd.  
 Exocafe  
 Fast & Epp Partners  
 Ferguson Simek Clark  
 FertiOr  
 Fielding Chemical Technologies Inc.  
 Fine Line  
 Fleetline Products Ltd.  
 Flint Energy Services Ltd.  
 Flynn Canada Ltd.  
 Ford Motor Company  
 Forintek Canada Corporation  
 Fracmaster Ltd.  
 Fraunhofer USA  
 Frontier Power Systems  
 Fuel Cells Canada  
 FuelMaker Corporation  
 Garland Canada  
 General Comminution Inc. (GCI)  
 GFI Control Systems Inc.  
 GIK Technical Institute (Pakistan)  
 Global Change Strategies International Inc.  
 Global Earth Products (GEP)  
 Glotman Simpson Consulting Engineers  
 Golder Associates  
 Gulf Canada Resources Ltd.  
 Gwich'in Development Corporation  
 H.R. West Holdings Inc.  
 Haebler Construction  
 Heating, Refrigeration and Air Conditioning  
 Institute of Canada (HRAI)  
 Highland Feeders  
 Highmark Renewables  
 Hill Phoenix Inc.  
 Husky Oil Operations Ltd.  
 Hydro Quebec  
 Hydrocarbon Dev. Institute (Pakistan)  
 Hydrogenics Corporation  
 IF Technology  
 Imperial Oil Resources Ltd.  
 IMW Industries Ltd.  
 Industrial Roof Consultants  
 Innovatech  
 Institute for Chemical Process and  
 Environmental Technology (ICPET)  
 Instituto Forestal (INFOR)  
 Integrated Control Devices Ltd.  
 International Centre for Sustainable Cities  
 inVentures Technologies Inc.  
 Iogen Corporation  
 Jasco Research Ltd.  
 Kahawatte Plantations Ltd.  
 KC Environmental Group Ltd.  
 Keen Engineering Ltd.  
 KeepRite Canada  
 KeySpan Corporation  
 Kinectrics Inc.  
 Kysor//Warren  
 Lafarge Canada  
 Ledcor Industries Ltd.  
 Levelton Engineering Ltd.  
 Limpieza Urbana S.A. (LIMSA)  
 LIMPURB  
 Linamar Corporation  
 Loblaw Properties Ltd.  
 Local Rural Stewardship Network(s)  
 Louisville Gas and Electric Company  
 LPP Manufacturing Inc.  
 Luscar Ltd.  
 Mabarex Inc.  
 MacIntyre Management Consultants Inc.  
 Malahat Systems Corporation (MSC)  
 Manasc-Isaac, Architects  
 Mariah Energy Corporation  
 Matrix Solar Technologies Inc.  
 MBR Research  
 McLeod Harvest  
 Micro Thermo Technologies  
 Mikro-Tek  
 Mobil Oil Canada  
 Morgan Falls Power  
 Musson Cattell Mackay Architects  
 NC Hircock Process Consulting Ltd.  
 NEG Micon Canada  
 New Paradigm Engineering Ltd.  
 Newfoundland and Labrador Hydro  
 Nexen Inc.  
 Norcan Hydraulic Turbine Inc.  
 Northstar Energy Inc.  
 Northwest Territories Power  
 Corporation (NWTTPC)  
 Norvik Traction Inc.  
 Nova Scotia Power Inc.  
 Novelek Technology Inc.  
 Nutech Energy Systems Inc.  
 Ocean Construction Supplies Ltd.  
 Omega Farms  
 Ontario Centre for Environmental  
 Technology Advancement (OCETA)  
 Ontario Clean Water Agency (OCWA)  
 Ontario Power Generation  
 Ontario Trillium Foundation  
 Optima Engineers and Constructors Inc.  
 Optimum Energy Management Inc.  
 Orenda Aerospace Corporation  
 Orion Bus Industries Ltd.  
 Osoyoos Indian Band Development  
 Corporation  
 Pakistan EPA

## ***Appendix Two: Private Companies and Organizations (continued)***

PanCanadian Resources	Sherex/OPW Inc.	Toronto District Heating Corporation (TDHC)
Pembina Institute	Sheridan Nurseries	Toronto Renewable Energy Co-operative (TREC)
Petro-Canada Ltd.	Siemens Westinghouse Power Corporation	TransAlta Utilities Corporation
Phillips Farevaag Smallemberg	Soc Trang Food Company	Trimac Transportation
Polymer-Bolwell Composites Inc. (PBC)	SOPREMA Canada	Turbocor Inc.
Portland Cement Association (U.S.)	Sorentec Ltée.	UMA
Power Utility Diagnostics Ltd.	Soybean Growers of Ontario	Unilux Manufacturing Ltd.
Powertech Labs	Spherical Solar Power	Union Gas Ltd.
Pozzolan International	SRI Homes International	Urban Ecology Design Collaborative
Precision Drilling Corporation	STAS	USfilter
Prime Environmental Systems Inc.	STCUM – Société de transport de la Communauté urbaine de Montréal	Veecam Metal Products Ltd.
Prince Edward Island Energy Corporation (PEIEC)	Stelco Steel Inc.	Venmar Ventilation
Petroleum Technology Research Centre (PTRC)	St. Gobain Glass (Germany)	Vergnet Canada Ltd.
QuestAir Technologies Inc.	Stuart Energy Systems Inc.	Vergnet S.A.
R.J. Burnside International Ltd. (BIL)	Sudbury Hydro	Visionwall Corporation
Rage Farms	Sulphur Experts Inc./Amine Experts Inc.	W.Y. Svrcek Engineering Ltd.
Raja Group (Pakistan)	Suncor Energy Inc.	Wascana Energy Ltd.
Ranger Oil Ltd.	Sundor Glass	Water and Earth Science Associates Ltd. (WESA)
RCL Environment Group Ltd.	Sunset Solar Systems	Waterloo North Hydro
RDII Utilities Consulting and Technologies Inc.	Sustainable Development Technology Canada	WBCSD
Refrigerant Services Inc. (RSI)	Swiderski Engineering	Wenvor Technologies Inc.
Renaissance Energy Ltd.	Syncrude Canada Ltd.	Westmar Consultants Inc.
Rick Paskal Livestock	Tata Tea Corporation	Westport Innovations Inc.
Romgas (Romania)	TCPL	Whitby Hydro
Rose Technology Group Inc.	TechnoCarb	Willis Energy Services Ltd.
Rothsay	Tecna S.A.	Wunsch Engineering Ltd.
RWDI	Tembec Inc.	Xantrex Technology Inc.
SAIC Canada	Terra Nova Marine Company Ltd.	YMCA Wellness Centre
Sairem	TESCOR, Inc.	Yugo-Tech (Canada)
Saskatchewan Power Corporation	Thomson and Howe Energy Systems Inc.	Yukon Electrical Company Ltd. (YECL)
Saskatchewan Research Council	Tilbury Cement Ltd.	Zenon Environmental Inc.
Save Energy Inc.	Tirino Corporation	
Schroeder Properties Ltd.	TMC Environmental (TMC)	
Shell Canada Ltd.	Toromont Energy	
	Toronto Atmospheric Fund	



## ***Appendix Three: Federal Partner Programs and Departments***

Agriculture and Agri-Food Canada – Energy Co-generation Program	Industry Canada – International Trade Fund
Agriculture and Agri-Food Canada – Prairie Farm Rehabilitation Administration	Industry Canada – Sustainable Cities Initiative
Agriculture and Agri-Food Canada – CanAdapt	Industry Canada – Technology Partnerships Canada
Agricultural Adaptation Council	National Research Council – Industrial Research Assistance Program
Atlantic Canada Opportunities Agency	National Research Council – Institute for Chemical Process and Environmental Technology
Canadian Adaptation and Rural Development	Natural Resources Canada – Bioenergy Development Program
Canada Economic Development – Quebec Region	Natural Resources Canada – Buildings Energy Technology Program
Canada Economic Development – IDEA SME	Natural Resources Canada – Canada Centre for Remote Sensing
Canada Mortgage and Housing Corporation – External Research Program	Natural Resources Canada – CANMET Energy Technology Centre - Devon
Canadian International Development Agency	Natural Resources Canada – CANMET Energy Technology Centre - Varennes
Department of Foreign Affairs and International Trade – Clean Development Mechanism and Joint Implementation Office (CDM/JI)	Natural Resources Canada – Emerging Technologies Program
Environment Canada – Air Pollution Prevention Directorate	Natural Resources Canada – Industry Energy Research and Development Program
Environment Canada – Commercial Chemicals Division	Natural Resources Canada – Office of Energy Efficiency
Environment Canada – Emissions Research and Measurement Division	Natural Resources Canada – Program of Energy Research and Development
Environment Canada – Environmental Protection	Natural Resources Canada – Renewable Energy Deployment Initiative
Environment Canada – Environmental Technology Advancement Directorate	Natural Resources Canada – Renewable Energy Technology Program
Environment Canada – Environmental Technology Centre	Natural Resources Canada – Transportation Energy Technology Program
Environment Canada – Meteorological Service of Canada	Public Works and Government Services Canada
Environment Canada – Microwave-Assisted Processes™ Division	Transport Canada
Environment Canada – Refrigerant Management Canada	Western Economic Diversification Canada
Environment Canada – Regional Offices	
Industry Canada – Canadian Office for Technology Exchange in the Environment	

## ***Appendix Four: Other Governments, Government Agencies, and Research Institutions in Canada and Abroad***

Alberta Department of Energy	Netherlands, TNO
Agence de l'efficacité énergétique du Québec	Ontario Clean Water Agency (OCWA)
Alberta Agriculture Research Institute	Ontario Ministry of Energy
Alberta Energy Research Institute	Ontario Ministry of Environment
Alberta Environment	Pakistan EPA
Alberta Research Council (ARC)	Petroleum Technology Research Centre
BC Government - Green Economy Secretariat	Province of Quebec
BC Ministry of Environment	Qingdao Municipal Government
Centre québécois de recherche et de développement de l'aluminium (CQRDA)	Russian Energy Efficiency Demonstration Zones (RUSDEM)
City of Burlington	Saskatchewan Industry and Resources
City of Calgary	Saskatchewan Research Council
City of Gatineau	STCUM – Société de transport de la Communauté urbaine de Montréal
City of Grande Prairie	Town of Devon
City of Sudbury	Town of Okotoks
City of Toronto	Town of Watson Lake
Federation of Canadian Municipalities	University of British Columbia
Government of Germany	University of Saskatchewan
Government of Ontario	University of Waterloo
Greater Vancouver Regional District (GVRD)	US Department of Energy
Hangzhou International Center (Government of China)	US EPA Greenhouse Gas Verification Center
Hangzhou Regional Center (Government of China)	Vancouver Island Capital Regional District (CRD)
Human Resources Development Council	Yukon Territorial Government
Ministère des Ressources naturelles du Québec	